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United States Patent [19]
Crowley**[11] Patent Number: 5,808,783**
[45] Date of Patent: Sep. 15, 1998**[54] HIGH REFLECTANCE GYRICON DISPLAY**

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(List continued on next page.)

[73] Assignee: Xerox Corporation, Stamford, Conn.*Primary Examiner*—Loha Ben*Attorney, Agent, or Firm*—Alexander E. Silverman**[21] Appl. No.: 713,936****[57] ABSTRACT****[22] Filed: Sep. 13, 1996**

A gyricon or twisting-ball display having superior reflectance characteristics comparing favorably with those of white paper. The display is based on a material made up of optically anisotropic particles, such as bichromal balls, disposed in a substrate having a surface. The particles situated closest to the substrate surface form substantially a single layer. Each particle in the layer has a center point, no particle in the layer being disposed entirely behind the center point of any nearest neighboring particle in the layer with respect to the substrate surface. Each particle in the layer has a projected area with respect to the substrate surface. Particles of the set are sufficiently closely packed with respect to one another in the layer that the union of their projected areas exceeds two-thirds of the area of the substrate surface. A rotatable disposition of each particle is achievable while the particle is thus disposed in the substrate; for example, the particles can already be rotatable in the substrate, or can be rendered rotatable in the substrate by a nondestructive operation. In particular, the particles can be situated in an elastomer substrate that is expanded by application of a fluid thereto so as to render the particles rotatable therein. A particle, when in its rotatable disposition, is not attached to the substrate. A reflective-mode display apparatus can be constructed from a piece of the material together with a mechanism (e.g., addressing electrodes) for facilitating rotation of at least one of the particles.

Related U.S. Application Data**[60] Provisional application No. 60/020,522**, Jun. 27, 1996.**[51] Int. Cl.⁶ G02B 26/00****[52] U.S. Cl. 359/296; 345/107; 427/214****[58] Field of Search 359/290, 296,**
359/298; 345/105, 106, 107; 427/214**[56] References Cited****U.S. PATENT DOCUMENTS**

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27 Claims, 18 Drawing Sheets